

$$f(x) = x\sqrt{x+3} = x(x+3)^{1/2}$$

$$f'(x) = \cancel{x} \cdot \frac{1}{2}(x+3)^{-1/2} + (x+3)^{1/2} \cdot 1$$

$$f'(x) = \frac{x}{2\sqrt{x+3}} + \frac{\sqrt{x+3} \cdot 2\sqrt{x+3}}{2\sqrt{x+3}}$$

$$f'(x) = \frac{x + 2(x+3)}{2\sqrt{x+3}} = \frac{3x+6}{2\sqrt{x+3}}$$

$$f' \begin{array}{c|c} 4 & -0 \\ \hline x & -3 \end{array} \quad +$$

Inc. $(-2, \infty)$

Dec. $(-\infty, -2)$

Rel. Min $x = -2$

$$f'(x) = \frac{3x+6}{2\sqrt{x+3}}$$

$$f''(x) = 2\sqrt{x+3} \cdot 3 - \frac{(3x+6)}{2\sqrt{x+3}}$$

$$f''(x) = \frac{6\sqrt{x+3} \cdot \frac{\sqrt{x+3}}{\sqrt{x+3}} - \frac{3x+6}{\sqrt{x+3}}}{4x+12}$$

$$f''(x) = \frac{6(x+3) - (3x+6)}{4x+12} \cdot \frac{1}{\sqrt{x+3}}$$

$$f''(x) = \frac{3x+12}{(4x+12)\sqrt{x+3}}$$

$(-3, 4)$ Concave down

$(4, \infty)$ Concave up
 $x = 4$ pt. of inf.





